U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGICAL CENTER

OFFICE NOTE 20

UPPER AIR ADP RECORDS FORMAT

James R. Neilon
Computation Branch
National Meteorological Center

June 1964

U.S. Department of Commerce

Weather Bureau

OFFICE NOTE NO. 20
COMPUTATION BRANCH
NATIONAL METEOROLOGICAL CENTER

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Each upper-air report is encoded in a single binary record containing not fewer than 50 words nor more than 150 words. The first three words are locators and identification. The next 45 words contain mandatory level data. The 49th word contains the station elevation. The 50th word contains counts of (1) significant temperatures (T), (2) winds by pressures (W_p), (3) tropopause words (T_r), and (4) winds by height (W_h). The remaining words, if any, contain the information for the above four categories. Missing data are denoted by a special form (Note 1).

Word	Contents	
1	Grid Co-ordinates	
	Bits S-17	$I \times 2^{-8}$
	Bits 18-35	$J \times 2^{-8}$
2	Geographical location	
	Bits S-17	Latitude in tenths of degrees
	Bits 18-35	Longitude in tenths of degrees (0-360°W)
3	Identification	
	Bit S	Correction (not used)
	Bits 1-5	Time in hours
	Bits 6-11	Report origin and type (Note 2)
	Bits 12-35	Station identification (Note 3)

4	1000 mb level (1st word)
	Bits S-17 Check bits (Note 4)
	Bits 18-35 D-value in tens of feet
5	1000 mb level (2nd word)
	Bits S-17 Temperature in tenths of degrees C
	Bits 18-35 Dew Point in tenths of degrees C
6	1000 mb level (3rd word)
	Bits S-17 Wind direction in tens of degrees
	Bits 18-35 Wind speed in knots

(The first bit of the D-value, Temperature, and Dew Point groups is the sign.)

7, 8, 9	850 mb level data with format of Words 4, 5, 6
10, 11, 12	700 mb level data with format of Words 4, 5, 6
13, 14, 15	500 mb level data with format of Words 4, 5, 6
16, 17, 18	400 mb level data with format of Words 4, 5, 6
19, 20, 21	300 mb level data with format of Words 4, 5, 6
22, 23, 24	250 mb level data with format of Words 4, 5, 6
25, 26, 27	200 mb level data with format of Words 4, 5, 6
28, 29, 30	150 mb level data with format of Words 4, 5, 6
31, 32, 33	100 mb level data with format of Words 4, 5, 6
34, 35, 36	70 mb level data with format of Words 4, 5, 6
37, 38, 39	50 mb level data with format of Words 4, 5, 6

40, 41, 42	30 mb level data with format of Words 4, 5, 6
43, 44, 45	20 mb level data with format of Words 4, 5, 6
46, 47, 48	10 mb level data with format of Words 4, 5, 6
49	Station elevation
	Bits S-2 Not used
	Bits 3-17 Station elevation in meters
	Bits 18-35 Radiation correction indicator
50	Bits S-8 Number of significant temperatures (T).
	Bits 9-17 Number of winds by pressure (W_p)
	Bits 18-26 Number of tropopause words (T_r)
	Bits 27-35 Number of winds by height (W_h)
51	Significant temperature word format (Note 5)
to	Bit S If one, represents tropopause
	Bits 1-11 Pressure in millibars
(51 + T - 1)	Bits 12-23 Temperature in tenths of degrees C.
	Bits 24-35 Dew Point in tenths of degrees C.
(51 + T)	Wind by pressure word format
to	Bits S-11 Pressure in millibars
(51 + T + W_p - 1)	Bits 12-23 Direction in tens of degrees
	Bits 24-35 Speed in knots
(51 + T + W_p)	Tropopause format (two words per tropopause report)
to	First Word

$(51 + T + W_p + T_r - 1)$	Bits S-11	Pressure in millibars
	Bits 12-23	Temperature in tenths of degrees C
	Bits 24-35	Dew Point in tenths of degrees C
	Second Word	
	Bits S-11	Height in hundreds of feet
	Bits 12-15	Tropopause characteristic (Note 6)
	Bits 16-20	Wind characteristic (Note 7)
	Bits 21-26	Wind direction in tens of degrees
	Bits 27-35	Wind speed in knots
$(51 + T + W_p + T_r)$	Wind by height word format	
to	Bit S	If one represents maximum wind
	Bits 1-2	Check bits (Note 8)
$(51 + T + W_p + T_r + W_h - 1)$	Bits 3-17	Height in tens of feet
	Bits 18-23	Wind direction in tens of degrees
	Bits 24-35	Wind speed in knots

NOTE 1 Groups filled with ones, except for the sign bit of the group, indicate missing for all types of data except time (word 3) and surface pressure (word 51). In the first case, missing (or not available) time is indicated by all ones in bits 1 through 5 (37 octal). In the latter case, missing surface pressure is indicated by all ones in bits 1 through 11 (3777 octal).

NOTE 2 Report origin and type (Bits 6-11 of Word 3). Consider the six binary bits as two octal digits XY

X

Ø Land station by block and station number

1 Land station by call letters

2 Fixed ship by call letters

3 Moving ship by call letters

Y

1 Raob

2 Electronic Wind

3 Visual Wind

4 Surface

5 RADAT

6 RAREP

In addition there are indicators for bogus and aircraft reports

XY	
4Ø	Bogus by block and station number
41	Bogus by latitude and longitude
42	Bogus -- Hurricane
43	Bogus -- Classified
44	Bogus, Surface by block and station number
45	Bogus, Surface by latitude and longitude
46	Bogus, Surface by call letters
47	Not used
50	Reconnaissance
51	Dropsonde
52	Aircraft - Doppler
53	Aircraft
54-57	Not used
60-67	Not used
70-77	Not used

NOTE 3 Station Identification (Bits 12-35 of Word 3)

When the report is from a source with block and station number

Bits 12-25 Block number

Bits 26-35 Station number

When the report is from a source with call letters the 24 bits are considered as four six-bit BCD characters and the call letters are contained in these positions with blank characters filling in at the right if needed.

NOTE 4 Check bits represent priority and the results of various tests as follows:

Bit S	Ø Failed 1 Passed	Hydrostatic check
Bit 1	Ø Failed 1 Passed	Tight Hydrostatic check
Bit 2	Ø Failed 1 Passed	Meteorological Data check (heights)
Bit 3	Ø Not manual data (height) 1 Manual data (height)	
Bit 4	Ø Calculated data (height) 1 Actual data (height)	
Bit 5	Ø Level not hydrostatically checked 1 Level hydrostatically checked	
Bit 6	Ø Failed 1 Passed	Theta check (temperature)
Bit 7	Ø Failed 1 Passed	Meteorological data check (temperature)
Bit 8	Ø Not manual data (temperature) 1 Manual data (temperature)	
Bit 9	Ø Calculated data (temperature) 1 Actual data (temperature)	
Bit 10	Ø Failed 1 Passed	"Motorboating" check (dew points)

Bit 11
- Ø Not manual data (dew point)
- 1 Manual data (dew point)

Bit 12
- Ø Calculated data (dew point)
- 1 Actual data (dew point)

Bit 13
- Ø Not manual data (wind)
- 1 Manual data (wind)

Bit 14
- Ø Failed
- 1 Passed

} Wind check

Bit 15
- Ø Level not checked (winds)
- 1 Level checked (winds)

Bit 16
- Ø Failed
- 1 Passed

} Tight wind check (winds)

Bit 17
- Ø Calculated data (winds)
- 1 Actual data (winds)

NOTE 5 The first significant temperature word always represent surface data. If the data are not reported, data are coded as missing.

NOTE 6 See Code Table 115, Manual for Radiosonde Code

NOTE 7 See Code Table 107, Manual for Radiosonde Code

NOTE 8 Check bits represent results of winds vertical consistency checks as follows:

ØØ Not checked

Ø1 Failed test

1Ø Passed loose test

11 Passed tight test

11/27/64

REVISION TO NMC OFFICE NOTE #20

Note 4 of Office Note No. 20 containing the upper air ADP Record Format should be revised to read as follows:

Bit S	Ø Failed hydrostatic check 1 Passed hystrostatic check
Bit 1	Ø Loose hydrostatic check 1 Tight hydrostatic check
Bit 2	1 Not used
Bit 3	Ø Not manual data (height) 1 Manual data (height)
Bit 4	Ø Calculated data (height) 1 Actual data (height)
Bit 5	Ø Level not hydrostatically checked 1 Level hydrostatically checked
Bit 6	Ø Temperature superadiabatic 1 Temperature not superadiabatic
Bit 7	1 Not used
Bit 8	Ø Not manual data (temperature) 1 Manual data (temperature)
Bit 9	Ø Calculated data (temperature) 1 Actual data (temperature)
Bit 10	Ø Failed "motorboating" check (Dew point) 1 Passed "motorboating" check (Dew point)
Bit 11	Ø Not manual data (dew point) 1 Manual data (dew point)

Bit 12	Ø Calculated data (dew point) 1 Actual data (dew point)
Bit 13	Ø Not manual data (wind) 1 Manual data (wind)
Bit 14	Ø Failed wind check 1 Passed wind check
Bit 15	Ø Level not checked (wind) 1 Level checked (wind)
Bit 16	Ø Loose wind check 1 Tight wind check
Bit 17	Ø Calculated data (wind) 1 Actual data (wind)

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Bit 6	Ø Temperature superadiabatic 1 Temperature not superadiabatic
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Bit 8	Ø Not manual data (temperature) 1 Manual data (temperature)
Bit 9	Ø Calculated data (temperature) 1 Actual data (temperature)
Bit 10	Ø Failed "motorboating" check (Dew point) 1 Passed "motorboating" check (Dew point)
Bit 11	Ø Not manual data (dew point) 1 Manual data (dew point)

Bit 12	Ø Calculated data (dew point) 1 Actual data (dew point)
Bit 13	Ø Not manual data (wind) 1 Manual data (wind)
Bit 14	Ø Failed wind check 1 Passed wind check
Bit 15	Ø Level not checked (wind) 1 Level checked (wind)
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(51 + T + W_p - 1)	Bits 12-23 Direction in tens of degrees
	Bits 24-35 Speed in knots
(51 + T + W_p)	Tropopause format (two words per tropopause report)
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$(51 + T + W_p + T_r - 1)$	Bits S-11	Pressure in millibars
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	Bits 1-2	Check bits (Note 8)
$(51 + T + W_p + T_r + W_h - 1)$	Bits 3-17	Height in tens of feet
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Bit 11	Ø	Not manual data (dew point)
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Bit 12	Ø	Calculated data (dew point)
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Bit 13	Ø	Not manual data (wind)
	1	Manual data (wind)
Bit 14	Ø	Failed } Wind check
	1	Passed }
Bit 15	Ø	Level not checked (winds)
	1	Level checked (winds)
Bit 16	Ø	Failed } Tight wind check (winds)
	1	Passed }
Bit 17	Ø	Calculated data (winds)
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